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Updating the available information from Spanish Red seabream fishery in the Strait of Gibraltar

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Abstract

This paper presents the available information of the Red seabream (Pagellus bogaraveo) Spanish fishery in the Strait of Gibraltar and updates the documents presented in previous years with the information from 2015. This document presents data about landings, CPUEs, spatial distribution and landings length frequencies which should be taken into account to provide the 2016 scientific advice for Red seabream in ICES Subarea IX.

1. Introduction and fishery description

Since the earlies 1980´s a Spanish artisanal fishery targeting to Red seabream (*Pagellus bogaraveo*, namely "*voraz*") have been developed in the Strait of Gibraltar area (ICES IXa South). This fishery has already been broadly described in previous Working Documents presented to the ICES WGDEEP (Gil *et al*., 2000; Gil & Sobrino, 2001, 2002 and 2004; Gil *et al*., 2003, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 and 2015). Spanish Red seabream fishery in the Strait of Gibraltar is almost a mono-specific fishery with a clear target species which represents the 74% from the total landed species which constitutes a fleet component by itself (Silva *et al*., 2002).

In 2006, 2008, 2010 and 2012 different trials were attempted to assess this resource within the ICES WGDEEP (ICES, 2006, 2008, 2010 and 2012). 2014 scientific advice was based on abundance indexes (DLS category 3). Our future goal is to achieve DLS category 1 (stocks with quantitative assessments) by developing a gadget model which analyzes and integrates all the available information. Meanwhile, abundance indexes along with all available information were updated till 2015 to give the scientific advice till the stock is benchmarked. Thus, the main objective of this paper is to provide to the 2016 ICES WGDEEP meeting with an updated summary of the available fishery information of this deep-water species in ICES area IXa.

2. Material and methods

Fishery information from the sale sheets was gathered for the period 1983-2015: monthly landings, monthly number of sales (as a proxy of fishing trip) and the number of days in which those sales were carried out. Moreover, monthly length frequency of landings from data collected by IEO monitoring program (since June 1997) was also estimated. (Gil *et al*., 2000).

Data from SLSEPA (a sort of Vessel Monitoring System) from the "*voracera*" fleet operating at the Strait of Gibraltar were available: boats carry a device, regionally called "green boxes" (to differentiate them from the EU VMS "blue boxes"), that transmit hour and positions, course and speed to the control centre every three minutes. Data were filtered and analyzed to estimate fishing effort, catch rates and the spatial distribution of the Red seabream fishery (Burgos *et al*., 2013).

3. Results and discussion

- Landings data: Figure 1 shows a continuous increase of annual landings in the beginning of the time series to reach a maximum in 1994. Since 1994, landings have decreased till 2002. However, landings have peaked in 1996 and 1997.Furthermore, it shows an increasing trend from 2003 to 2009, followed by a new decrease till 2013 with the lowest value of the time series. In 2014 landings increase more than the 100% in comparison with the previous year. The increasing trend stills in 2015, when 166 tons were landed at the two main ports (Tarifa and Algeciras). Discards can be assumed to be zero or negligible, thus landings can be used as a proxy of catches It should be noted that not all the catches/landings come exclusively from ICES area IX: however it was considered from the same stock unless the fishing area is placed between different Regional Organizations/Commissions (ICES, GCFM and CECAF) borders (Figure 2).

- CPUEs: Nominal abundance index shows ups and downs throughout the historical series (Figure 3). It is important to emphasize that the effort unit selected(number of sales) may not be appropriate as does not consider the missing effort. Thus, in the most recent years, when the resource is not too abundant, the missing effort may increase substantially (fishing vessels with no catches thus sale sheet are not recorded). Therefore, the CPUE trend since the first fishery´s decline (1997) should be interpreted with caution because it cannot be a real image of the resource abundance. A severe decreasing trend is observed since 2010, whereas it increases in the last two years (2014 and 2015),similarly to landings.

Table 1 updates the available information from regional VMS (SLSEPA), following the data compilation and its process described by Burgos *et al*. in 2013.

Table I. Estimates of fishing effort and CPUEs from the "*voracera*" fleet targeting Red seabream based on regional VMS (SLSEPA) and fishery statistics (sales sheets). Data from 2009 to 201 extracted from Burgos *et al.* (2013).

Data Source		2009	2010	2011	2012	2013	2014	2015
Fleet equipped with SLSEPA devices (green boxes)	No. Boats	85	82	82	60	60	61	60
	No. Sales	7,200	5,863	4,711	2,946	2,086	2,989	3,079
	Fishing days (trips)	8,373	7,238	6,160	3,686	2,695	4,191	4,234
	Fishing operations (hauls)	60,593	46,579	38,345	22,329	14,140	21,110	21,508
	Blackspot seabream Landings (kg)	459,010	274,882	190,786	79,163	39,799	94,261	137,344
	CPUE 1 (Landings/Sales)	64	47	40	27	19	32	45
	CPUE 2 (Landings/Fishing days)	55	38	31	21	15	22	32
	CPUE 3 (Landings/Hauls)	8	6	5	4	3	4	6
	Proportion (%) of missing effort ([Fishing days-No. Sales]/Fishing days)	14	19	24	20	23	29	27
Total voracera fleet	No. Boats	98	94	86	68	62	61	62
	No. Sales	8,892	6,932	5,659	3,638	2,222	3,527	3,384
	Estimated Fishing days (trips) (Landings/VMS CPUE2)	10,564	9,627	7,741	5,867	4,480	6,119	5,137
	Fishing operations (hauls)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Blackspot seabream Landings (kg)	579,140	316,546	239,751	126,006	66,159	137,623	166,651
	CPUE 1 (Landings/Sales)	65	46	42	35	30	39	49

It can be observed in figure 3 that CPUE 1 estimated from total landings and number of sales decreased in the period 2009-2013 from 65 to 30 k fishing trip^{-1} for the total "*voracera*" fleet as well as the CPUE 1 for the fleet equipped with the SLSEPA device (64 to 19 k fishing trip^{-1}). Afterwards, it increases till 49 and 45 k fishing trip^{-1} in 2015, respectively. As expected, CPUE 2 (landings/fishing days), where the effort is estimated from the VMS device also declined with lower values than CPUE 1 because the fact of the missing effort. Again the values in the last two years were higher but didn't reach the CPUE 1 ones. So, 2009 - 2015 estimated CPUE from VMS analysis shows the same trend but lower values than the nominal one (Figure 3).

Moreover, the proportion of missing effort (how much effort is not taken into account using CPUE1) almost doubled from 2009 to 2015 (from 14% to 27%), coinciding with the decrease in stock abundance after 2009, the last landings´ peak.

- Length frequencies:

The mean length of landings seems to have decreased in two different periods: from 1995 to 1998 and from 2009 to 2013 (Figure 4). It is necessary to point out that this species probably do not have a homogeneous geographic and bathymetric distribution related to their length. This fact could explain the different landed mean length between the main landing ports: Tarifa and Algeciras. So the mean length became lower since 2010 but again (like landings and CPUE) increases in last two years. In 2015 total length median and mean value reached 36 and 37.6 cm, respectively.

4. Main conclusions

Most recent signals (landings, CPUEs and length distribution) show clear increasing trends. However, there is no evidence about its sustainability so further steps towards the fishery analytical assessment (i.e. gadget model) should be encouraged.

Besides, in 2014 scientific advice (recommended catch) was based upon DLS method 3.2, where C_{y+1} was taken as C_{y-1} (instead of the mean catch from the last 3years) because a steep decline in the catch and in the abundance index (CPUE from VMS) was observed till 2013. This year the issue is just the contrary: does we apply C_{y-1} or 3 last years´ mean catch to give the scientific advice for 2017 and 2018? Using the mean prevents the adoption of a high figure and seems to be more precautionary. Anyway, the final decision should be adopted within the 2016 WGDEEP.

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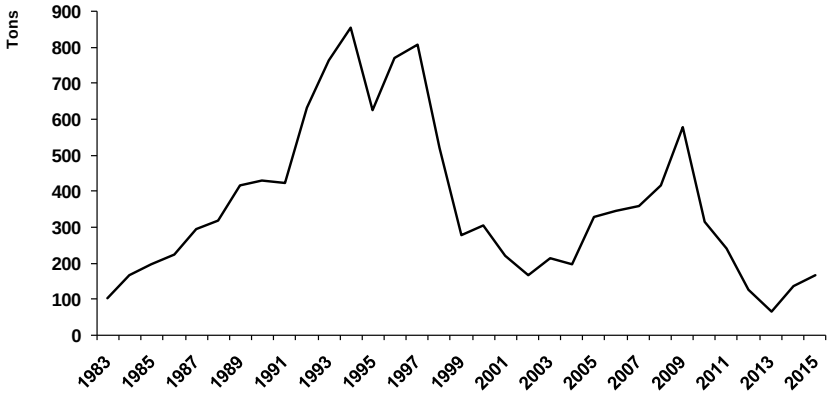

Figure 1. Red seabream Spanish "*voracera*" fishery of the Strait of Gibraltar: landings (1983-2015).

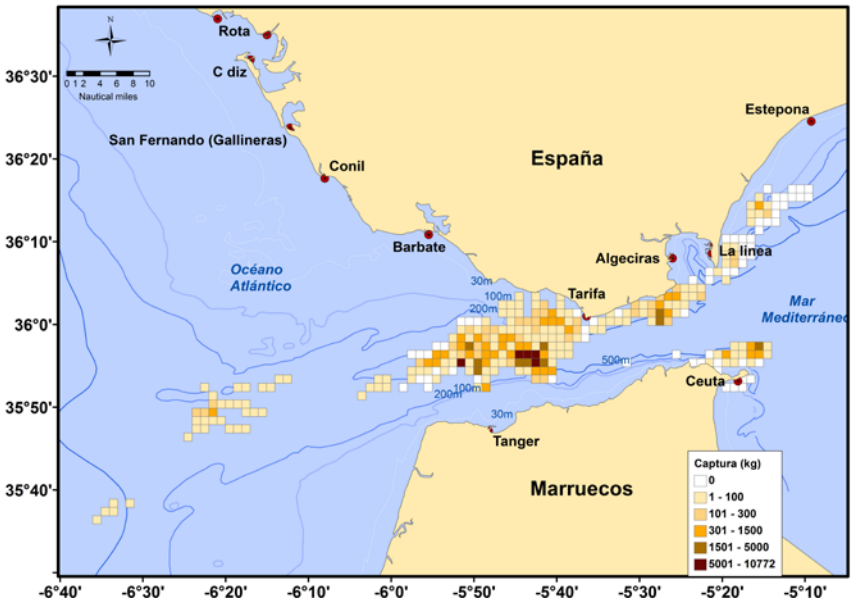

Figure 2. Red seabream Spanish "*voracera*" fishery of the Strait of Gibraltar: spatial distribution of landings (2014).

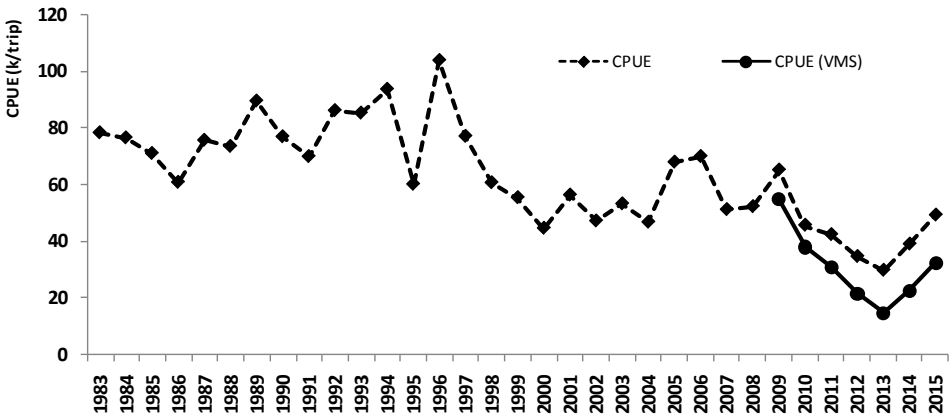

Figure 3. Red seabream Spanish "*voracera*" fishery of the Strait of Gibraltar: nominal CPUE (1983-2015) (dotted line) and standardized (from VMS) CPUE (2009-2015).

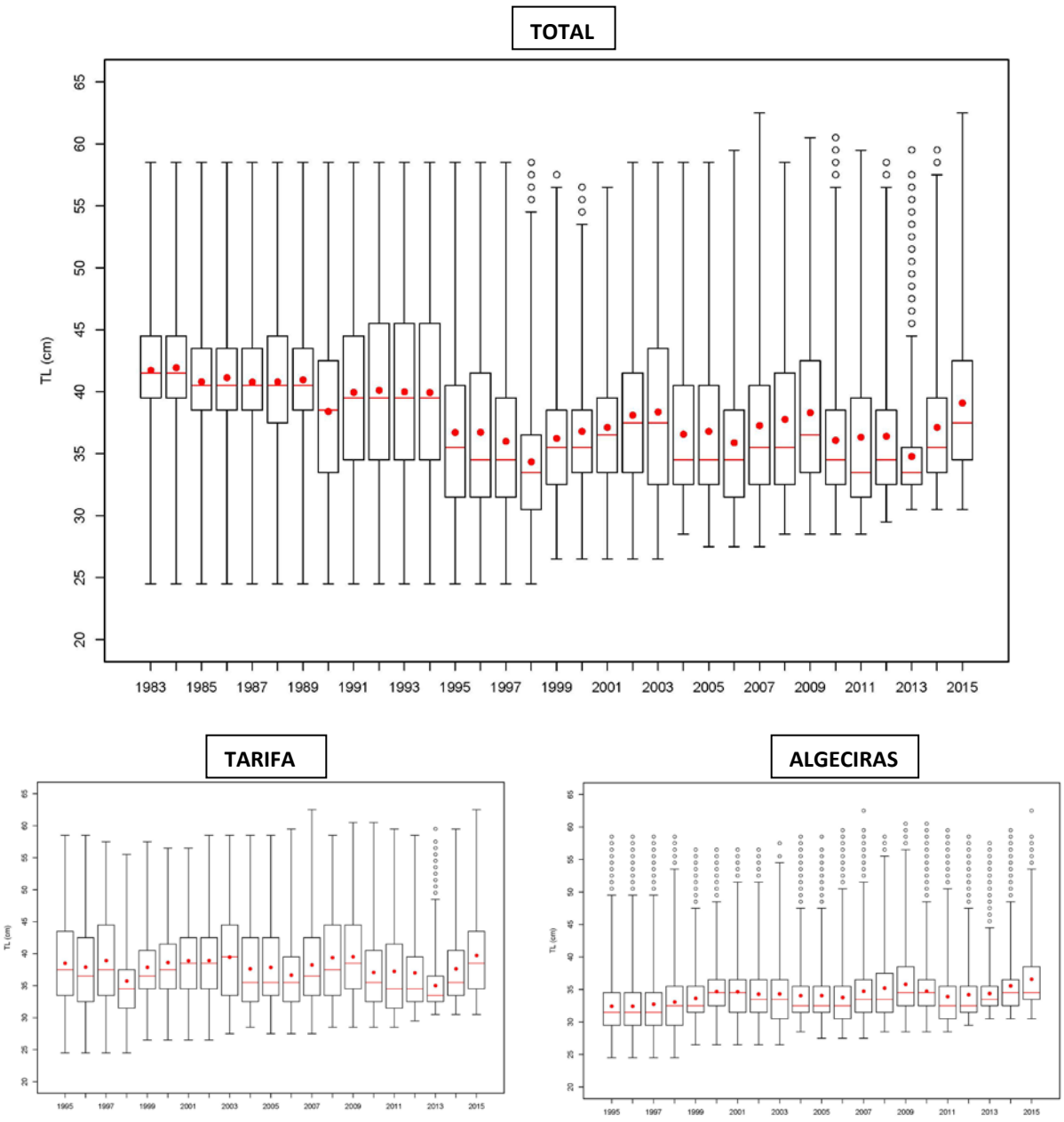

Figure 4. Red seabream Spanish "*voracera*" fishery of the Strait of Gibraltar: landings length distribution (total and by landing port) descriptive statistics (red dot: mean value, red line: median value, box: interquartile range, whisker: most extreme value within 3 times the inter-quartile range, circles: outliers).